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BUREAU OF SHIPS GROUP 1 TECHNICAL INSPECTION REPORT

CONFIDENTIAL

Classification (Cancelled) (Changed to _____)

By Authority of Joint Chiefs of Staff (Action 15 Apr 49)

By *[Signature]* Date *24 Apr 51*

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U.S.S. MUGFORD (DD 389)
Naval Support Agency
Washington, D. C. 20301

TEST ABLE

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BUREAU OF SHIPS GROUP
TECHNICAL INSPECTION REPORT

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By Authority of Joint Chiefs of Staff (Action 15 Apr 49)
By *John B. Galt* Date *24 Apr 51*
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F.X. Forest,
Captain, U.S.N.

USS MUGFORD (DD389)

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SECRET

USS MUGFORD (DD389)

U.S.S. MUGFORD (DI 389)

SHIP CHARACTERISTICS

Building Yard: Boston Naval Shipyard.

Commissioned: 16 August 1937.

HULL

Length Overall 341 feet 4 inches.

Length on Waterline: 334 feet 0 inches.

Beam (extreme): 35 feet 6 inches.

Depth (molded at side, to main deck, amidships):
19 feet 7 7/8 inches.

Drafts at time of test: Fwd. 11 feet 3 inches.
Aft. 12 feet 3 inches.

Standard displacement: 1,500 tons.

Displacement at time of test: 1,975 tons.

MAIN PROPULSION PLANT

Main Engines: Two sets of G.E. Turbines are installed in ship. One set per shaft.

Reduction Gears: Two sets of De-Laval double reduction are installed, one per turb. set.

Main Condensers: Two are installed in ship.

Boilers: Four boilers are installed in ship. Type: Babcock and Wilcox, and Foster Wheeler. 400 psi - gauge - 700° F.

Propellers: Two are installed.

Main Shafts: Two are installed.

Ships Service Generators: Four are installed in ship.

Two 132 K.W. - A-C, and two 40 K.W. - D.C.

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7.65[#] WEB SPCD. = 7'-0"
KEEL BKT. SPCD. = EVERY FRAME



TEST A

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TECHNICAL INSPECTION REPORT

OVERALL SUMMARY

I. Target Condition After Test.

(a) Drafts after test; list; general areas of flooding, sources.

There was no flooding, hence no change in drafts or list.

(b) Structural damage.

HULL

The web of frame 171 under the main deck is distorted slightly in way of a lightening hole. There is no other structural damage.

MACHINERY

No comment.

ELECTRICAL

No comment.

(c) Other damage.

HULL

No comment.

MACHINERY

None.

ELECTRICAL

There was no damage whatever to any electrical equipment on the vessel.

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II. Forces Evidenced and Effects Noted.

(a) Heat.

HULL

Heat radiation emanated from a point bearing about 170 degrees relative and at an elevation of about four degrees. There is slight scorching of paint on surfaces facing aft and to starboard. There is no scorching of canvas.

MACHINERY

None, except scorching and blistering of paint on exposed machinery.

ELECTRICAL

The only effect of heat noted was the slight scorching of paint on surfaces directly exposed to the blast.

(b) Fires and explosions.

HULL

None.

MACHINERY

No evidence.

ELECTRICAL

There were no fires and no explosions on the vessel.

(c) Shock.

HULL

None.

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MACHINERY

No evidence.

ELECTRICAL

No effects of shock were found in any electrical equipment.

(d) Pressure.

HULL

Pressure caused elastic deflection of the main deck, aft, which stressed the supporting girders severely. Both flag bags are slightly dished and the uptake breeching is somewhat distorted.

MACHINERY

A staybolt on the starboard side of the uptake breeching pulled loose.

ELECTRICAL

No effect of pressure were found in any electrical equipment.

(e) Effects apparently peculiar to the atom bomb.

HULL

None.

MACHINERY

None.

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ELECTRICAL

The only effect peculiar to the atom bomb found was a slight scorching of paint by radiant heat on surfaces exposed to the blast.

III. Effects of Damage.

(a) Effect on machinery, electrical, and ship control.

HULL

Not observed.

MACHINERY

None. The ship was underway for two hours at speeds up to 10 knots after Test A. All machinery operable before the test was operated after it.

ELECTRICAL

Electrical damage caused no change in ship control. There is no electric propulsion on the vessel.

(b) Effect on gunnery and fire control.

HULL

Not observed.

MACHINERY

No comment.

ELECTRICAL

There was no change in gunnery or fire control caused by electrical damage.

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(c) Effect on water-tight integrity and stability.

HULL

None.

MACHINERY

No comment.

ELECTRICAL

There was no change in water-tight integrity nor in stability caused by any electrical damage.

(d) Effect on personnel and habitability.

HULL

Exposed personnel probably would have been burned. There is no effect on habitability.

MACHINERY

None below deck.

ELECTRICAL

Electrical damage had no effect whatever on personnel nor did it change the habitability of the vessel.

(e) Total effect on fighting efficiency.

HULL

Except for the effects of heat and radioactivity there would have been no effect on fighting efficiency.

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MACHINERY

None.

ELECTRICAL

The fighting efficiency of the vessel was in no way reduced by electrical damage.

IV. General Summary of Observers' Impressions and Conclusions.

HULL

None.

MACHINERY

The MUGFORD was outside the effective range of the explosion in Test A.

ELECTRICAL

The only effect of the blast on the vessel was a slight scorching of paint work. The lack of any damage precludes any conclusions as to the ruggedness of electrical equipment on the vessel.

V. Preliminary General or Specific Recommendations of Inspection Group.

HULL

None.

MACHINERY

None.

ELECTRICAL

As there was no damage, no recommendations are made.

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TECHNICAL INSPECTION REPORT

SECTION I - HULL

GENERAL SUMMARY OF HULL DAMAGE

I. Target Condition After Test.

- (a) Drafts after test; list; general areas of flooding, sources.

There was no flooding, hence no change in drafts or list.

- (b) Structural damage.

The web of frame 171 under the main deck is distorted slightly in way of a lightening hole. There is no other structural damage.

- (c) Other damage.

Not observed.

II. Forces Evidenced and Effects Noted.

- (a) Heat.

Heat radiation emanated from a point bearing about 170 degrees relative and at an elevation of about four degrees. There is slight scorching of paint on surfaces facing aft and to starboard. There is no scorching of canvas.

- (b) Fires and explosions.

None.

- (c) Shock.

None.

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(d) Pressure.

Pressure caused elastic deflection of the main deck, aft, which stressed highly the supporting girders. Both flag bags are slightly dished and the uptake breeching is somewhat distorted.

(e) Effects peculiar to the Atom Bomb.

None.

III. Results of Test on Target.

(a) Effect on machinery, electrical, and ship control.

Not observed.

(b) Effect on gunnery and fire control.

Not observed.

(c) Effect on watertight integrity and stability.

None.

(d) Effect on personnel and habitability.

Exposed personnel probably would have been burned.
There is no effect on habitability.

(e) Effect on fighting efficiency.

Except for the effects of heat and radioactivity there would have been no effect on fighting efficiency.

IV. Summary of Observers Impressions and Conclusions.

None.

V. Preliminary Recommendations.

None.

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VI. Instructions for loading the vessel specified the following:

ITEM	LOADING
Fuel oil.	Minimum.
Diesel oil.	Minimum.
Ammunition.	10%
Potable and reserve feed water.	95%
Salt water ballast.	350 tons.

Details of the actual quantities of the various items aboard are included in Report 7, Stability Inspection Report, submitted by the ship's force in accordance with "Instructions to Target Vessels for Tests and Observations by Ship's Force" issued by the Director of Ships Material. This report is available for inspection in the Bureau of Ships Crossroads Files.

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DETAILED DESCRIPTION OF HULL DAMAGE

A. General Description of Hull Damage.

There is no significant damage. Paint on exposed surfaces is slightly scorched. Pressure caused elastic deflection of the main deck aft and dishing of light metal items such as flag bags and uptake breeching. Typical exterior views of the ship are shown on pages 33 and 34.

B. Superstructure.

The port and starboard flag bags are slightly dished. The uptake breeching is slightly dished, and one internal tie rod punched through the metal casing. Paint is scorched on surfaces facing aft and to starboard.

C. Turrets, Guns, and Directors.

No damage.

D. Torpedo Mounts, Depth Charge Gear.

No damage.

E. Weather Deck.

A scratch gage located on the first platform at frame 173, centerline, indicates 5/16 inch elastic deflection of the main deck. No movement is recorded by five other scratch gages throughout the length of the ship.

F. Exterior Hull.

No damage.

G. Interior Compartments (Above Waterline).

At frame 171, centerline, under the main deck, paint is flaked off of the supporting structure. The web of frame 171 is distorted

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slightly in way of a cutout for a lightening hole. There is no other damage.

H. Armor Decks and Miscellaneous Armor.

Not applicable.

I. Interior Compartments (Below Water line).

No damage.

J. Underwater Hull.

No damage.

K. Tanks.

No damage.

L. Flooding.

None.

M. Ventilation.

No damage.

N. Ship Control.

No damage.

O. Fire Control.

No damage.

P. Ammunition Behavior.

No damage.

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Q. Ammunition Handling.

No damage.

R. Strength.

No damage.

S. Miscellaneous.

One layer (only) of paint was scorched in the following locations:

1. The after face of bulkhead 72, forecastle deck, starboard. (Photo 1849-11, page 35).

2. After side of 20mm gun bulward at frame 105, starboard, and two stanchions supporting this gun platform.

3. Antenna lead-in trunk and life jacket stowage on the after side of the bridge.

The major portion of scorched paint occurred where this paint was applied to aluminum bulkheads of the superstructure.

No scorching of cordage or canvas was discovered.

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TECHNICAL INSPECTION REPORT

SECTION II - MACHINERY

GENERAL SUMMARY OF MACHINERY DAMAGE

I. Target Condition After Test.

(a) Drafts after test; list; general areas of flooding, sources.

No comment.

(b) Structural damage.

No comment.

(c) Other damage.

None.

II. Forces Evidenced and Effects Noted.

(a) Heat.

None, except scorching and blistering of paint on exposed machinery.

(b) Fires and explosions.

No evidence.

(c) Shock.

No evidence.

(d) Pressure.

A staybolt on the starboard side of the uptake breeching pulled loose.

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(e) Effects apparently peculiar to the atom bomb.

None.

III. Effects of Damage.

(a) Effect on machinery and ship control.

None. The ship was underway for two hours at speeds up to 10 knots after Test A. All machinery operable before the test was operated after it.

(b) Effect on gunnery and fire control.

No comment.

(c) Effect on water-tight integrity and stability.

No comment.

(d) Effect on personnel and habitability.

None below decks.

(e) Total effect on fighting efficiency.

None.

IV. General Summary.

The MUGFORD was outside the effective range of the explosion in Test A.

V. Preliminary Recommendation.

None.

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DETAILED DESCRIPTION OF MACHINERY DAMAGE

A. General Description of Machinery Damage.

(a) Overall condition.

The machinery plant was not affected by Test A. The vessel was underway for two hours at speeds up to 10 knots after the test.

(b) Areas of major damage.

None.

(c) Primary cause of damage.

Not applicable.

(d) Effect of target test on overall operation of machinery plant.

Overall operation of the machinery plant was not affected by Test A.

B. Boilers.

1. Boilers were not damaged by Test A. Boilers #1 and #2 were tested hydrostatically and found to be tight. Boilers #3 and #4 were steamed after the test and no defects were found.

2. Stacks and uptakes were undamaged except for a stay bolt on the after starboard side which pulled loose from the outer casing. This has no effect on operation.

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HYDROSTATIC TEST DATA OF BOILER #1

	Before Test A	After Test A
Initial Pressure	450 lb/sq. in.	460 lb/sq. in.
Time required for pressure to drop		
100 lb/sq. in.	1 hour	1 hour
200 lb/sq. in.	2 3/4 hours	2 1/2 hours
Pressure remaining after		
24 hours	75 lb/sq. in.	70 lb/sq. in.

FORCED DRAFT BLOWER TEST

	Before Test A	After Test A
Blower #1		
3650 R.P.M.	9"	9"
Blower #2		
3750 R.P.M.	9"	9"
C. Blowers.		

Forced draft blowers were not damaged by Test A. Blowers #1, 2, 3, & 4 were operated in service after the test. A test of blowers #1 and 2 to determine the RPM required to maintain an air pressure of 9 inches of water in a boiler indicates no difference in performance before and after the test.

D. Fuel Oil Equipment.

Fuel oil equipment was not damaged by Test A. All of it was used in normal operation after the test. There is a

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coil leak in #3 fuel oil heater (#1 fire room) but this condition existed before the test.

E. Boiler Feedwater Equipment.

This equipment was not damaged. It has been used in normal operation after Test A.

F. Main Propulsion Machinery.

Main engines were not damaged by Test A. They have been used underway at speeds up to 10 knots after Test A. Leads left in the bearings of the starboard low pressure turbine indicate slight motion of the rotor (not over .003 inch).

BEARING LEAD DATA

STARBOARD L. P. TURBINE - FORWARD BEARING

Forward Lead	Before Test A	After Test A	Difference
Port	.010	.011	+.001
Top	.0155	.0125	.003
Stb'd	.010	.009	.003
After Lead			
Port	.008	.007	.001
Top	.015	.009	.006
Stb'd	.0145	.0085	.006

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STARBOARD L. P. TURBINE - AFTER BEARING

Forward Lead	Before Test A	After Test A	Difference
Port	.0085	.008	.005
Top	.0145	.015	+.0005
Stb'd	.0095	.007	.0025
After Lead			
Port	.0075	.0065	.001
Top	.0145	.0115	.003
Stb'd	.0165	.0065	.010

G. Reduction Gears.

Undamaged. The reduction gears were checked in normal operation with the ship underway.

H. Shafting and Bearings.

Undamaged. Shafting and bearings were checked while the ship was underway.

I. Lubrication System.

Undamaged. No. 1 purifier was inoperable before Test A but its condition was not changed by the test. All other equipment in the lubrication system has been checked during normal operation with the ship underway.

J. Condensers and Air Ejectors.

Undamaged. The equipment has been operated under service conditions since Test A.

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K. Pumps.

Undamaged. All pumps were operated while the ship was underway.

L. Auxiliary Generators (Turbines and Gears).

Undamaged. The ship's service generators have been operated under service conditions since Test A.

M. Propellers.

The propellers have not actually been inspected but have been checked while the ship was underway. Performance was normal.

N. Distilling Plant.

Undamaged. The distilling plant has been in normal operation since Test A.

O. Refrigeration Plant.

Undamaged. The refrigeration equipment has been in normal operation since Test A.

P. Winches, Windlasses, and Capstans.

Undamaged. All equipment has been operated under service conditions since Test A.

Q. Steering Engine.

Undamaged. The equipment was in operation during the time the ship was underway following the test.

R. Elevators, Ammunition Hoists, etc.

Undamaged. All equipment has been operated under service conditions since Test A.

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S. Ventilation (Machinery).

Undamaged. All ventilation machinery has been in normal operation since Test A.

T. Compressed Air Plant.

Undamaged. The air compressors have been in normal operation since Test A.

U. Diesels (Generators and Boats).

1. Undamaged. The emergency diesel generator has been operated under service conditions since Test A.

2. No boats were on board during Test A.

V. Piping Systems.

Undamaged. All lines have been tested at operating pressures. No leaks were found.

W. Miscellaneous.

Undamaged. Galley, laundry, and machine shop equipment has been operating normally since Test A.

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TECHNICAL INSPECTION REPORT

SECTION III - ELECTRICAL

GENERAL SUMMARY OF ELECTRICAL DAMAGE

I. Target Condition After Test.

- (a) Drafts after test; list; general areas of flooding, sources.

Drafts and lists were not observed. There was no flooding.

- (b) Structural damage.

Not observed.

- (c) Other damage.

There was no damage whatever to any electrical equipment on the vessel.

II. Forces Evident and Effects Noted.

- (a) Heat.

The only effect of heat noted was the slight scorching of paint on surfaces directly exposed to the blast.

- (b) Fires and Explosions.

There were no fires and no explosions on the vessel.

- (c) Shock.

No effects of shock were found in any electrical equipment.

- (d) Pressure.

No effects of pressure were found in any electrical

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equipment.

- (e) Any effects apparently peculiar to the Atom Bomb.

The only effect peculiar to the Atom Bomb found was a slight scorching of paint by radiant heat on surfaces exposed to the blast.

III. Effects of Damage.

- (a) Effect on electric propulsion and ship control.

Electrical damage caused no change in ship control. There is no electric propulsion on the vessel.

- (b) Effect on gunnery and fire control.

There was no change in gunnery or fire control caused by electrical damage.

- (c) Effect on watertight integrity and stability.

There was no change in watertight integrity nor in stability caused by any electrical damage.

- (d) Effect on personnel and habitability.

Electrical damage had no effect whatever on personnel nor did it change the habitability of the vessel.

- (e) Total effect on fighting efficiency.

The fighting efficiency of the vessel was in no way reduced by electrical damage.

IV. General Summary of Observer's Impressions and Conclusions.

The only effect of the blast on the vessel was a slight scorching of paint work. The lack of any damage precludes any

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conclusions as to the ruggedness of electrical equipment on the vessel.

V. Preliminary General or Specific Recommendations.

As there was no damage, no recommendations are made.

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DETAILED DESCRIPTION OF ELECTRICAL DAMAGE

A. General Description of Electrical Damage.

(a) Overall condition.

The overall condition of the electric plant was unchanged.

(b) Areas of major damage.

There was no damage.

(c) Primary causes of damage in each area of major damage.

There was no damage.

(d) Operability of electric plant.

1. Ship's service generator plant - not affected.
2. Engine and boiler auxiliaries - not affected.
3. Electrical propulsion - does not apply.
4. Communications - not affected.
5. Fire control circuits - not affected.
6. Ventilation - not affected.

(e) Types of equipment most affected.

No equipment was affected.

B. Electric Propulsion Rotating Equipment S-41.

This item does not apply to the vessel.

C. Electric Propulsion Control Equipment S-41.

This item does not apply to the vessel.

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D. Ship's Service Generators S-61.

Inspection of the machines revealed no damage. All units have been operated under normal load conditions and have worked satisfactorily.

E. Emergency Generators S-61.

No damage to the emergency Diesel generator was found on inspection. The machine was operated for a period of about 2 hours on return of the crew to the ship after the test. Excitation for this 2 hour run was by storage batteries as the exciter armature had been damaged previously to the blast and had thereby been prevented from operating as scheduled during the test.

F. Switchboards and Distribution Panels S-62.

No damage was found in any switchboard or distribution panel. All panels and boards were operated in normal service after the blast.

G. Wiring, Wiring Equipment and Wire Ways S-62.

No wiring, wire ways or wiring equipment was damaged in any way by the blast.

H. Transformers S-62.

No damage was found in any transformer as the result of the blast.

I. Submarine Propelling Batteries S-62.

This item does not apply to the vessel.

J. Portable Batteries S-62.

No portable battery was damaged, nor was any battery shifted as a result of the blast.

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K. Motors, Motor Generator Sets and Motor Controllers S-63.

All motors, motor generator sets and motor controllers operated satisfactorily after the test and none showed any damage.

L. Lighting Equipment S-64.

No change whatever in lighting equipment was found following the ABLE test. No broken lamps were found after the test.

M. Searchlights S-66.

All searchlights were inspected and were found to be undamaged by the test.

N. Degaussing Equipment S-81.

The degaussing system of the vessel was undamaged by the test.

O. Gyro Compass Equipment S-24.

No damage was found by inspection in any gyro compass equipment. The gyro compass was started and was used for navigational purposes while the vessel was shifting berth.

P. Sound Powered Telephones S-65.

No sound powered telephone equipment was found to have been damaged by the test.

Q. Ship's Service Telephones S-65.

The sound powered telephones are the only telephones on the vessel.

R. Announcing Systems S-65.

No damage to any announcing equipment was found by inspection. All equipment was found to be operable. Exposed P. A. E. equipment on the navigation bridge was found in good condition.

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S. Telegraph S-65.

Inspection showed all telegraph systems to be undamaged. All systems operated satisfactorily during underway operation.

T. Indicating Systems S-65.

No damage was found in any indicating system. All systems operated satisfactorily during underway operation.

U. I. C. and A. C. O. Switchboards S-65.

No damage was found in the I. C. nor in the A. C. O. switchboards.

V. F. C. Switchboards S-71.

No damage was found in the F. C. switchboard.

W. Special Bureau of Ships Code 660 Equipment.

No damage was found in any of the Bureau of Ships special 660 electrical material installed for the test.

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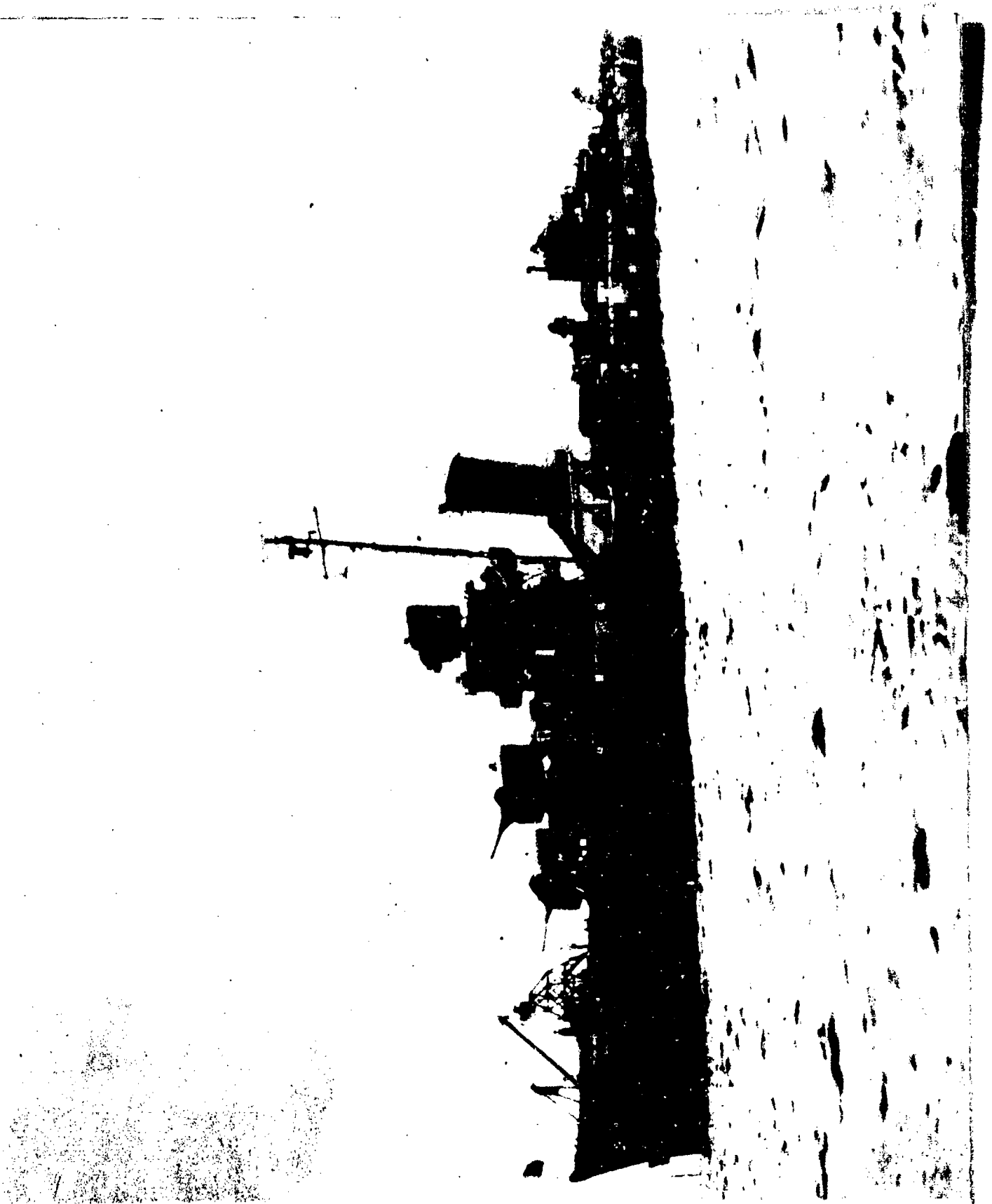
SECTION IV

PHOTOGRAPHS

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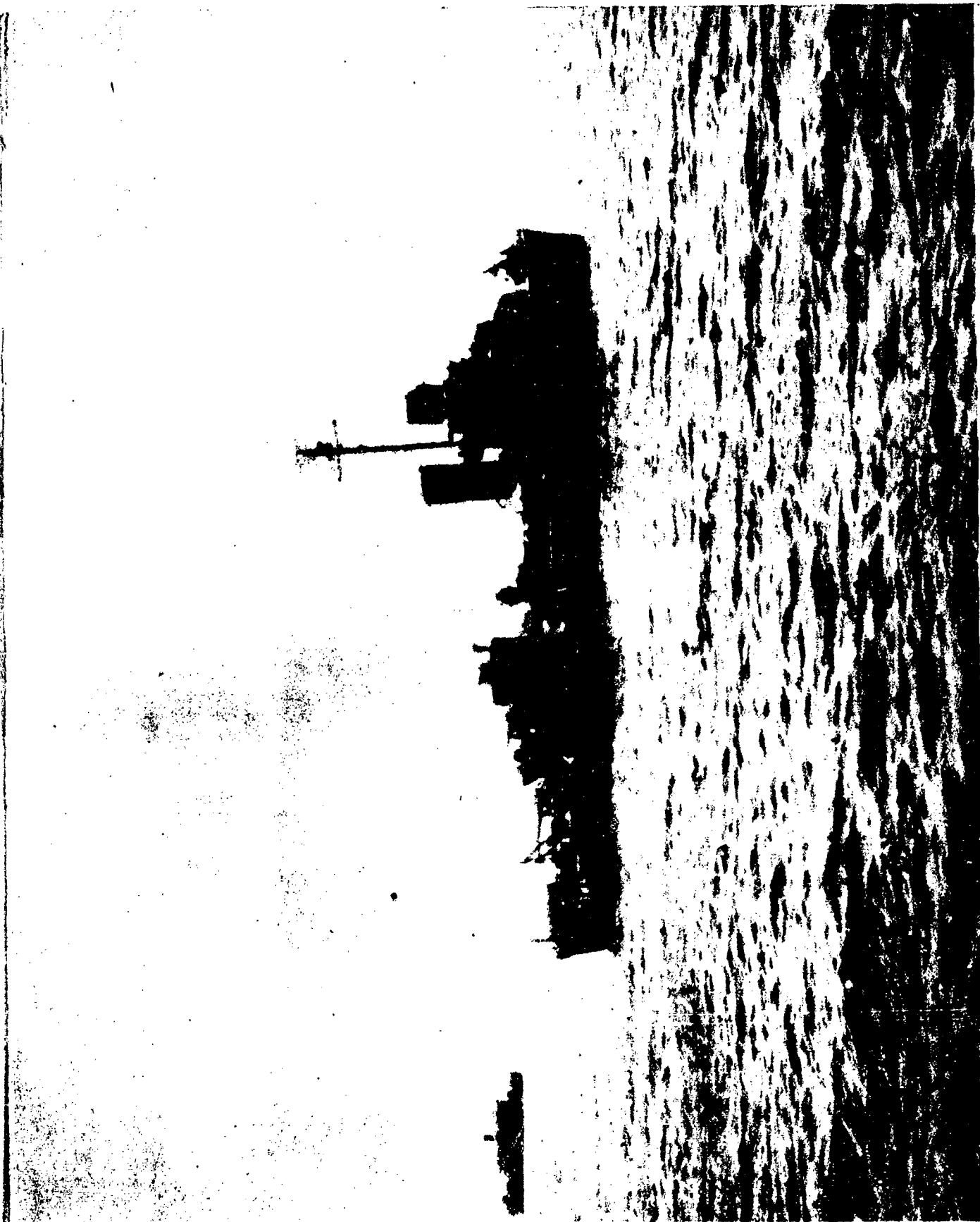
AA-CR-227-92-106. View from off port bow after Test A.

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AA-CF-227-49-96. View from off starboard quarter after Test A.

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AA-CR-65-1849-11. Blistered paint on bulkhead 72, starboard, fore-castle deck. This is an example of the worst paint damage found on this ship.

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APPENDIX

COMMANDING OFFICERS REPORT

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REPORT #11
COMMANDING OFFICER'S REPORT
SECTION I

U.S.S. MUGFORD (DD389), BAGLEY Class, located in berth 204, 2300 yards east-south-east of center of target array.

The ship was in excellent material condition at the time of Test A. The only weakness was an extremely weak fire and flushing system which frequently ruptures at normal working pressure.

This vessel was loaded with less than 10% fuel oil and 350 tons of salt water ballast. This loading was the optimum for stability. Ten percent service ammunition and a small amount of test ammunition was carried. This ammunition was distributed throughout the ship. All exposed canvas and line was struck below. The only combustible material exposed to the blast was the paint on the outside of the ship.

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SECTION II

There was no damage sustained by this vessel except two minor items described below.

Paintwork on vertical surfaces was scorched and blistered one coat deep in a few spots on the starboard side. Estimated total area of scorched paint is 100 sq. feet. The heat wave struck the ship from 165° relative and at a downward angle of about 5°. These figures are determined from shadows cast by stanchions and railings. This vessel is painted navy grey (dark). The major portion of scorched paint occurred where this paint was applied to aluminum bulkheads of the superstructure.

One brick was loosened from the front of #1 boiler. This brick was the one next to the register removed for entering the boiler. It is highly probable that the blast had nothing to do with loosening this brick.

The only evidence of shock is the loosening of the rust on the outside surface of inner uptake casings.

It is the commanding officer's opinion that there would have been no personnel casualties and no effect on the fighting efficiency of the ship and crew if all hands top side had been properly dressed in flash clothing. This does not take into consideration the temporary blindness caused by the flash.

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SECTION III

In view of the lack of damage to the MUGFORD, there are no comments of special nature concerning the effects of the Test on this vessel. After viewing the damage sustained by blast on the destroyers it is believed that the superstructure should be constructed in a streamlined manner with emphasis placed on the elimination of rectangular recesses and dead ends which trap the blast and suffer damage. 8-600

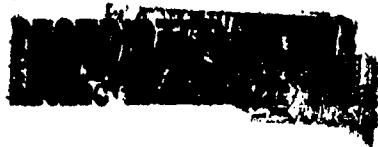
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USS MUGFORD (DD389)

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Classification (~~Canceled~~) (Changed to **CONFIDENTIAL**)
By Authority of Joint Chiefs of Staff (Action 15 Apr 49)
John Edgar Date *28 Apr 51*
AF 501



CONFIDENTIAL



Defense Special Weapons Agency
6801 Telegraph Road
Alexandria, Virginia 22310-3398

TRC

4 April 1997

MEMORANDUM TO DEFENSE TECHNICAL INFORMATION CENTER
ATTN: OMI/Mr Bill Bush

SUBJECT: Declassification of Documents

The following is a list of documents that have been declassified and the distribution statement changed to Statement A, Approved for Public Release.

XRD-41, AD-366731-
XRD-42, AD-366732-
XRD-40, AD-366730-
XRD-39, AD-366729-
XRD-38, AD-366728-
XRD-34, AD-366720-
XRD-13, AD-366725-
XRD-8, AD-366699-
XRD-5, AD-366697-
XRD-6, AD-366698-
XRD-21, AD-366708-
XRD-27, AD-366714-
XRD-22, AD-366709-
XRD-26, AD-366713-
XRD-28, AD-366715-
XRD-29, AD-366727-
XRD-36, AD-366722-

If you have any questions, please call me at 703-325-1034.

Arndith Jarrett
ARDITH JARRETT
Chief, Technical Resource Center